What is claimed:

1. An optical disk comprising;

a recording layer having servo tracks; and

a clock reference structure formed along the servo tracks, the clock reference structure permitting data marks to be written and re-written to the recording layer in data fields of indeterminate length, the reference clock structure permitting the generation of a clock reference signal which controls where first and second transition edges of data marks are written to the recording layer with sub-bit accuracy.

2. The optical disk as recited in claim 1, wherein the clock reference structure comprises a reference spatial frequency which is greater than a predetermined spatial frequency.

3. The optical disk as recited in claim 2, wherein the predetermined spatial frequency is the maximum spatial frequency detectable by a standard DVD-ROM reader.

4. The optical disk as recited in claim 2, wherein the clock reference structure comprises edges of grooves of the servo tracks which oscillate in-phase at an oscillation spatial frequency, the oscillation spatial frequency corresponding to the reference spatial frequency.

5. The optical disk as recited in claim 2, wherein the clock reference structure comprises edges of grooves of the servo tracks which oscillate substantially 180 degrees out-of-phase at an oscillation spatial frequency, the oscillation spatial frequency corresponding to the reference spatial frequency.

6. The optical disk as recited in claim 2, wherein the clock reference structure comprises pits formed along the servo tracks, the reciprocal of a distance between centers of adjacent pits corresponding to the reference spatial frequency.

7. The optical disk as recited in claim 1, wherein a first optical transducer coupled to the clock reference structure generates a clock reference signal comprising a clock reference signal frequency.

8. The optical disk as recited in claim 7, wherein the first optical transducer coupled to data marks on the recording layer generates a data signal having a frequency spectrum in which all fundamental frequency components of the frequency spectrum are less than the clock reference signal frequency.

9. The optical disk as recited in claim 8, wherein a standard DVD-ROM reader can read the data marks but cannot detect the clock reference structure.

10. An optical disk recorder comprising:

an optical disk rotatably mounted on the recorder, the optical disk having a recording layer containing servo tracks;

a first optical transducer optically coupled to the recording layer of the optical disk, the first optical transducer following a servo track as the optical disk rotates;

a clock reference structure formed along the servo tracks providing data fields of indeterminate length, the clock reference structure causing the first optical transducer to produce a clock reference signal as the optical disk rotates;

means for recording data marks on the recording layer of the optical disk, wherein the data marks are recorded to include fundamental spatial frequencies less than a predetermined spatial frequency; and

a write clock which determines the placement of first and second transition edges of data marks on the recording layer of the optical disk with sub-bit accuracy, the write clock being phase locked to the clock reference signal.

11. The optical disk recorder as recited in claim 10, wherein the predetermined spatial frequency is the greatest spatial frequency detectable by a standard DVD-ROM reader.

12. The optical disk recorder as recited in claim 10, wherein the servo tracks include grooves and the clock reference structure comprises edges of the grooves which oscillate in-phase.

13. The optical disk recorder as recited in claim 12, wherein data marks cause the first optical transducer to produce an unwanted data signal as the optical disk rotates, and the clock reference signal is separated from the unwanted data signal by detecting the clock reference signal using radial push-pull detection.

14. The optical disk recorder recited in claim 10, wherein the servo tracks include grooves and the clock reference structure comprises edges on the grooves which oscillate substantially 180 degrees out-of-phase.

15. The optical disk recorder recited in claim 14, wherein data marks cause the first optical transducer to produce and unwanted data signal as the optical disk rotates, and the clock reference signal is separated from the unwanted data signal by detecting the clock reference signal using split detection.

16. The optical disk recorder recited in claim 10, wherein the clock reference structure comprises pits formed along the servo tracks.

17. The optical disk recorder as recited in claim 10, wherein the data marks are positioned along the servo tracks according to a DVD-ROM standard.

18. The optical disk recorder as recited in claim 10, wherein the data marks are arbitrarily coded.

19. The optical disk recorder as recited in claim 10, further comprising a second optical transducer which is optically coupled to the data marks on the recording layer, the second optical transducer following a servo track as the optical disk rotates, the data marks causing the second optical transducer to produce a data signal as the optical disk rotates.

20. The optical disk recorder as recited in claim 19, wherein the first optical transducer comprises a first laser and a first objective lens and the second transducer comprises a second laser and a second objective lens.

21. The optical disk recorder as recited in claim 20, wherein a numerical aperture of the combination objective lens is adjustably controlled to be lower when reading data than when recording data.

22. The optical disk recorder as recited in claim 20, wherein a numerical aperture of the combination objective lens is adjustably controlled to be lower when reading data than when recording data.

23. The optical disk recorder as recited in claim 20, wherein a wavelength of the second laser is greater than a wavelength of the first laser.

24. An optical disk recorder for receiving an optical disk which is rotatably mountable on the recorder, the optical disk comprising a recording layer having servo tracks and a clock reference structure having a spatial frequency which is greater than a predetermined spatial frequency, the clock reference structure being formed along the servo tracks and providing data fields of indeterminate length, the optical disk recorder comprising:

a first optical transducer which can optically couple to a recording layer of the optical disk, the first optical transducer following the servo tracks as the optical disk rotates, the clock reference structure causing the first optical transducer to produce a clock reference signal as the optical disk rotates;

means for writing data marks on the recording layer of the optical disk; and

a write clock which determines the physical placement of first and second transition edges of data marks written on the recording layer of the optical disk with sub-bit accuracy, the write clock being phase locked to the clock reference signal.

25. The optical disk recorder as recited in claim 24, wherein the predetermined spatial frequency is the maximum spatial frequency detectable by a standard DVD-ROM reader.

26. The optical disk recorder as recited in claim 24, wherein the first optical transducer can detect higher spatial frequencies that an optical transducer of a standard DVD-ROM optical disk reader.

27. The optical disk recorder as recited in claim 24, further comprising a second optical transducer which can optically couple to the data marks on the recording layer, the second optical transducer following a servo track as the optical disk rotates, the data marks causing the second optical transducer to produce a data signal as the optical disk rotates.

28. The optical disk recorder as recited in claim 24, wherein the first optical transducer comprises a first laser and a first objective lens and the second transducer comprises a second laser and a second objective lens.

29. The optical disk recorder as recited in claim 28, wherein a combination objective lens is both the first objective lens and the second objective lens and the objective lens.

30. The optical disk recorder as recited in claim 29, wherein a numerical aperture of the combination objective lens is adjustably controlled to be lower when reading data than when recording data.

31. The optical disk recorder as recited in claim 29, wherein a wavelength of the second laser is greater than a wavelength of the first laser.

32. The optical disk as recited in claim 7, wherein the first optical transducer coupled to data marks on the recording layer generates a data signal having a frequency spectrum in which the clock reference signal frequency is within fundamental frequency components of the frequency spectrum.

33. The optical disk as recited in claim 32, further including means for optically separating the data from the clock reference signal.

34. The optical disk as recited in claim 32, further including means for optically separating the clock reference signal the form the data signal.

Sub B7

35. An optical disk comprising;

a recording layer having servo tracks;

a clock reference structure formed along the servo tracks, the clock reference structure permitting data marks to be written and re-written to the recording layer in data fields of indeterminate length, the reference clock structure permitting the generation of a clock reference signal which controls where first and second transition edges of data marks are written to the recording layer with sub-bit accuracy;

a first optical transducer coupled to the clock reference structure generating a clock reference signal comprising a clock reference signal frequency; and wherein the first optical transducer coupled to data marks on the recording layer generates a data signal having a frequency spectrum in which the clock reference signal frequency is within fundamental frequency components of the frequency spectrum.

36. An optical disk recorder comprising:

an optical disk rotatably mounted on the recorder, the optical disk having a recording layer containing servo tracks, the servo tracks comprising grooves;

a first optical transducer optically coupled to the recording layer of the optical disk, the first optical transducer following a servo as the optical disk rotates;

a clock reference structure comprising edges of the grooves which oscillate in-phase formed along the servo tracks, the clock reference structure providing data fields of indeterminate length, the clock reference structure causing the first optical transducer to produce a clock reference signal as the optical disk rotates;

means for recording data marks on the recording layer of the optical disk, wherein the data marks are recorded to include fundamental spatial frequencies less than a predetermined spatial frequency;

a write clock which determines the placement of data marks on the recording layer of the optical disk, the write clock being phase locked to the clock reference signal; and

wherein data marks cause the first optical transducer to produce an unwanted data signal as the optical disk rotates, and the clock reference signal is separated from the unwanted data signal by detecting the clock reference signal using radial push-pull detection.

37. An optical disk recorder comprising:

an optical disk rotatably mounted on the recorder, the optical disk having a recording layer containing servo tracks, the servo tracks comprising grooves;

a first optical transducer optically coupled to the recording layer of the optical disk, the first optical transducer following a servo track as the optical disk rotates;

a clock reference structure comprising edges on the grooves which oscillate substantially 180 degrees out-of-phase formed along the servo tracks, the clock reference structure providing data fields of indeterminate length, the clock reference structure causing the first optical transducer to produce a clock reference signal as the optical disk rotates;

means for recording data marks on the recording layer of the optical disk, wherein the data marks are recorded to include fundamental spatial frequencies less than a predetermined spatial frequency;

a write clock which determines the placement of data marks on the recording layer of the optical disk, the write clock being phase locked to the clock reference signal; and

wherein data marks cause the first optical transducer to produce an unwanted data signal as the optical disk rotates, and the clock reference signal is separated from the unwanted data signal by detecting the clock reference signal using split detection.

* * * * *

Add A1

Add B9